

REMARKS

Favorable reconsideration of this application, as presently amended and in view of the following discussion, is respectfully requested.

Claims 1-35 are pending. The present amendment amends Claims 1-5 and 7-9 and adds new Claims 11-35. Support for the changes to the claims is found in the originally filed claims and in Figures 2, 8, 9, 11, 13, and 17 of the specification, for example. Thus, the changes are not believed to raise an issue of new matter. Amendments to the original claims are made to clarify whether or not various claim limitations are to be interpreted under 35 U.S.C. § 112, sixth paragraph. With respect to new Claim 24, it is noted that M.P.E.P. § 2106.IV.B.2(c) explicitly provides for claims drawn to a signal.

Before turning to the outstanding Office Action, Applicant would first like to thank the examiners for the courtesies extending during the personal interview of September 9, 2003. During the interview, arguments in support of patentability were presented, and the examiners indicated that further search and analysis would be performed. The remarks below summarize the discussion that took place during the interview.

At numbered paragraph 2 of the outstanding Office Action, the Abstract was objected for containing too many words. Accordingly, the Abstract is presently amended to have fewer than 150 words.

Turning now to the merits of the application, Claims 1, 2, 4, and 10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Mauro et al. in view of Itoh et al.; Claim 3 was rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Mauro et al. and Itoh et al., and further in view of Vilmur et al.; Claims 5, 6, 8, and 9 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Mauro et al. and Itoh et al. and further in view of Crozier et al.; and Claim 7 was rejected under

35 U.S.C. § 103(a) as being unpatentable over the combination of Mauro et al., Itoh et al., and Crozier et al., and further in view of Vilmur et al.

As discussed during the interview, Applicant respectfully traverses these rejections on the grounds that independent Claim 1, when considered as a whole, defines a device that is neither anticipated by, nor obvious over, the applied references. The features of Claim 1 include a spectrum subtracter configured to subtract from the amplitude spectrum a product of the noise spectrum and the first perceptual weight as controlled by the perceptual weight controller. The perceptual weight controller is configured to control the first perceptual weight "based on the signal to noise ratio." Claim 1. The weight used in the subtracting circuit 34 of Itoh et al. is not controlled based on the signal to noise ratio. Col. 8, ll. 39-58. Specifically, Itoh et al.'s weighting function is based on the frequency band and predetermined values. Col. 8, ll. 39-58; Figure 7. Accordingly, neither Itoh et al. nor Mauro et al., which does not even have a spectrum subtracter, discloses a spectrum subtracter configured to subtract from the amplitude spectrum a product of the noise spectrum and the first perceptual weight, where a perceptual weight controller is configured to control the first perceptual weight based on the signal to noise ratio.

Additionally, Claim 1 recites a spectrum subtracter and a spectrum amplitude suppressor configured to multiply a spectrum obtained from the spectrum subtracter. The outstanding Office Action notes that the Mauro et al. reference discloses a spectrum amplitude suppressor, but not a spectrum subtracter. The Office Action relies on the Itoh et al. reference as disclosing a spectrum subtracter at Figure 2, reference 34 (the "subtracting circuit"). Office Action, page 3. Even if the outstanding Office Action's characterization of the applied references were correct, neither Mauro et al. nor Itoh et al. provides motivation for combining the reference teachings to arrive at the claimed invention.

The spectrum subtraction subtracts from the input signal a noise spectrum predicted from the input signal. Ideally, this spectrum subtraction subtracts only noise signals from the input signal independently of the waveform of the input signal, to achieve a large amount of noise reduction. However, spectrum subtraction can cause musical noise. On the other hand, spectral amplitude suppression is a process which performs amplitude suppression of the spectral amplitude. Although this spectral amplitude suppression cannot normally cause musical noise easily, if a large amount of noise suppression is performed, the waveform of the input speech signal is transformed.

The present invention controls the spectrum subtraction and the spectrum amplitude suppression, adopting the frequency specific characteristic of speech and noise, by combining the spectrum subtraction and the spectrum amplitude suppression and using different perceptual weights, respectively. In other words, the invention can change the noise suppression, depending on the frequency band. Therefore, the present invention enjoys the advantage of each process and reduces the above-mentioned faults of each process, simultaneously. Namely, the invention can achieve a large amount of noise suppression while preventing the transformation of the waveform of the input speech signal and preventing the generation of musical noise. The advantages of, and the motivation for, combining different processing techniques in the manner claimed is only provided in the present specification and is not found in the applied references. Thus, it would not be obvious to one of ordinary skill in the art to use the spectrum amplitude suppressor of Mauro et al. in combination with the spectrum subtracter of Itoh et al. Specification, p. 6, lines 11-20; p. 22, line 21; p. 24, line 19.

Turning now to Vilmur et al. and Crozier et al., those references fail to account for the above-noted deficiencies of the Mauro et al. and Itoh et al. references. Thus, Applicant submits that the applied references, when considered alone or in any proper combination, do

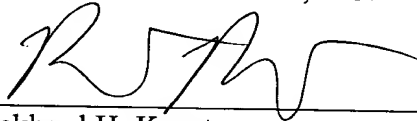
not teach or suggest the invention of Claim 1. Therefore, Applicant submits that Claim 1 and all claims dependent therefrom patentably distinguish over the applied references.

New independent Claims 12, 23, and 24 are analogues of Claim 1, and thus, Claims 12, 23 and 24 are believed to patentably distinguish over the applied references for at least the same reasons as Claim 1. New Claims 25-35 include patentably distinguishing features that are similar to those found in Claim 1 and are therefore believed to be patentable for at least the same reasons as Claim 1.

In view of the foregoing discussion, no further issues are believed to be outstanding in the present application. Therefore, Applicant respectfully requests that the present application be allowed and be passed to issue.

Respectfully submitted,

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